



Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

coincide with DC . Draw AI parallel and AK perpendicular to DC and let $EFGH$ be the rectangle.

Then $\frac{1}{2}(AI+DC) \times AK = EF \times FG + FG \times GC + \frac{1}{2}(AI+EF)(AK-KR')$.
But $AK=11.2$ inches, $AI=7.8$ inches. $\therefore 588=28 EF+33 FG$.

\therefore for maximum 28 $EF=33 FG$. $\therefore EF=10.5$ inches, FG 8.91 inches.

26. Proposed by J. F. W. SCHEFFER, A. M., Hagerstown, Maryland.

$ABCD$ represents a triangle, and $ABEF$ a trapezoid which is perpendicular to the rectangle, both figures having the side AB common to each other, and ADF and BCE forming two right triangles perpendicular to the rectangle $ABCD$. To determine the conoidal surface $CDFE$ so as to satisfy the condition that any plane laid through AB will intersect it in a straight line. Also find volume of the surface thus formed.

Solution by the PROPOSER.

Let $BC=AD=h$, $AB=a$, $BE=b$, $AF=c$. Let P represent a point in the surface, and put $AR=x$, $RQ=y$, $PQ=z$

The triangles BGK , PQR , and AHI are similar, and we may now put $AH=ny$, $IH=nz$, $BG=my$, $KG=mz$; but $h:mz=b-my$; $h:nz=c:c-nz$, whence $m=\frac{bh}{hy+bz}$, $n=\frac{ch}{hy+cz}$.

In the trapezoid $AHGB$, we now have
 $AB=a$, $AH=\frac{chy}{hy+cz}$, $BG=\frac{bhy}{hy+bz}$, $AR=x$,

$RQ=y$. $\therefore (AH+y)x + (BG+y)(a-x) = (AH+BG)a$.

Substituting, clearing of fractions, and arranging, we find for the equation of the surface

$$abcz^2 + a(b+c)hyz - (b-c)h^2xy + ah^2y^2 - abchz - ach^2y = 0.$$

Let us now denote $\angle CBK = \angle DAI$ by θ , and angles BCK and ADI represent by C and D . For the volume we have $\frac{1}{6}ah^2 \int_0^{\pi} \left[\frac{\sin^2 C}{\sin^2(C+\theta)} \right.$

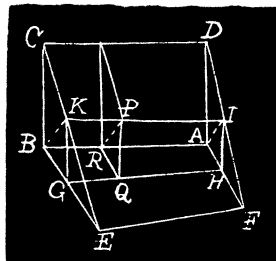
$$+ \frac{\sin^2 D}{\sin^2(D+\theta)} + \frac{\sin C \sin D}{\sin(C+\theta) \sin(D+\theta)} \Big] d\theta = \frac{1}{6}ah^2 \left[\tan C + \tan D \right. \\ \left. + \frac{\tan C \tan D}{\tan C - \tan D} \log \frac{\tan C}{\tan D} \right] \text{ but } \tan C = \frac{b}{h}, \tan D = \frac{c}{h};$$

$$\therefore \text{volume} = \frac{1}{6}ah \left[b+c + \frac{bc}{b-c} \log \frac{b}{c} \right].$$

27. Proposed by ADOLPH BAILOFF, Durand Wisconsin.

A line BF , that bisects an angle exterior to the vertical angle of an isosceles triangle is parallel to the base AC .

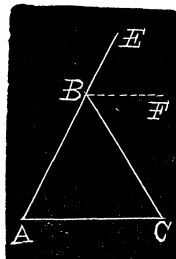
Solution by Mrs. MARY E. HOGSETT, Danville, Kentucky; P. S. BERG, Apple Creek, Ohio, Professors JOHN FAUGHT, Bloomington, Indiana; and M. A. GRUBER, War Department, Washington, D. C.



$$\angle EBC = \angle A + \angle C = 2\angle C.$$

But $\angle EBC = 2\angle FBC$, since BF is the bisector of $\angle EBC$. $\therefore 2\angle FBC = 2\angle C$, or $\angle FBC = \angle C$.

Hence, BF is parallel to AC , because if two straight lines are cut by a third straight line making the alternate interior angles equal, the two lines are parallel.



Solutions were also received from *J. K. ELLWOOD*, *H. G. WHITAKER*, and *G. B. M. JERR*.

NOTE—No solution has yet been received to problem 20.

CALCULUS.

Conducted by *J. M. COLAW*, Monterey, Va. All contributions to this department should be sent to him.

SOLUTIONS TO PROBLEMS.

20. Proposed by *F. P. MATZ*, M. Sc., Ph. D., Professor of Mathematics and Astronomy in New Windsor College, New Windsor, Maryland.

$$\int_0^{\frac{1}{2}\pi} \sqrt{(1-e^2 \cos^2 \phi)(1-e^2 \sin^2 \phi)} d\phi = \text{what?}$$

Solution by Professor *J. F. W. SCHEFFER*, A. M., Hagerstown, Maryland.

$$\begin{aligned} \sqrt{(1-e^2 \cos^2 \phi)(1-e^2 \sin^2 \phi)} &= \sqrt{1-e^2(\cos^2 \phi + \sin^2 \phi) + e^4 \sin^2 \phi \cos^2 \phi} \\ &= \sqrt{1-e^2 + \frac{e^4}{4} \sin^2 2\phi} = \sqrt{1-e^2 + \frac{e^2}{4} - \frac{e^4}{4} \cos^2 2\phi} \\ &= \frac{1}{2} \sqrt{(2-e^2)^2 - e^4 \cos^2 2\phi} = \frac{1}{2} \sqrt{(2-e^2)^2 - e^4 \sin^2 \left(\frac{\pi}{2} - 2\phi\right)} \\ &= \frac{1}{2} (2-e^2) \sqrt{1 - \frac{e^4}{(2-e^2)^2} \sin^2 \left(\frac{\pi}{2} - 2\phi\right)}. \end{aligned}$$

$$\begin{aligned} \therefore \int_0^{\frac{\pi}{2}} d\phi \sqrt{(1-e^2 \cos^2 \phi)(1-e^2 \sin^2 \phi)} \\ &= -\frac{1}{4} (2-e^2) \int_{\frac{1}{2}\pi}^{-\frac{1}{2}\pi} d\left(\frac{\pi}{2} - 2\phi\right) \sqrt{1 - \frac{e^4}{(2-e^2)^2} \sin^2 \left(\frac{\pi}{2} - 2\phi\right)} \\ &= \frac{1}{4} (2-e^2) \int_{-\frac{1}{2}\pi}^{+\frac{1}{2}\pi} d\lambda \sqrt{1 - \frac{e^4}{(2-e^2)^2} \sin^2 \lambda} \end{aligned}$$